

AQUATIC ANGIOSPERMS

Records of four introduced species new to Victoria

by

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In recent years the author has been working on the distribution of aquatic species within Victoria, and the upgrowth of interest in this field has led to the discovery of naturalized occurrences of four species of aquatic angiosperms previously unrecorded for this State. These are: *Lilaea scilloides* (Poir.) Haum., *Ludwigia palustris* (L.) Ell., *Myriophyllum brasiliense* Cambess., and *Sagittaria graminea* Michx. var. *weatherbiana* (Fernald) Bogin. With the exception of *Myriophyllum brasiliense* all these discoveries also constitute new records of these species for Australia.

Details of the finding and distribution of these species, and various salient notes on each, are now given.

Lilaea scilloides (Poir.) Haum.

On 12 October 1961, Mr. Fred Swindley, then an officer of the Fisheries and Wildlife Department, Melbourne, located this species at a point approximately $\frac{1}{2}$ mile N.E. of Laverton, Victoria, which is about 13 miles W.S.W. of Melbourne. Here a small creek flows intermittently across the basalt plain, emptying eventually into temporary swamps at Altona, and the species concerned was found present at one of the few pools of permanent water along the creek. Plants were in about 1 foot of water, with the top few inches emergent, and lined the edges of the pool but did not extend into deeper water. All floral and fruiting stages were present, both with the bisexual flower-spikes and the sessile female organs. As far as can be ascertained, this is the first known Australian occurrence of this North and South American species, and it is regarded as a recent accidental introduction to this State. Portion of Swindley's collection is housed at the National Herbarium of Victoria.

On 16 October 1962, the author visited the Laverton site and found the species still prevalent at the original precise location. Further material (Aston No. 839) was collected from a depth of 9 inches of water at the pool-edge, and again it was noticed that the plant did not extend into deeper waters. Flowering and fruiting were well evident. On 28 September 1964, I again visited the site and found the situation much as in the previous instance. In addition, plants were located 100 yards downstream, on damp mud left above the receding water-level, and specimens of these were taken (Aston No. 1223). Plants in this situation were thriving well, with all floral and fruiting stages present.

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The above observations are in agreement with Mason (1957) who describes the species as an annual, either terrestrial on wet soil or aquatic. Subject to man's non-interference (the main pool is directly alongside the Melbourne-Geelong Highway) the colony at Laverton shows every sign of persisting. Downstream spread will probably be limited as the creek waters soon become saline, but dispersal to other areas may be effected by such agents as waterfowl, for fruits are produced in considerable quantity. At present the species shows no sign of being a pernicious spreader.

A botanical description and illustration is available in Mason (1957, p. 101 and fig. 42).

***Ludwigia palustris* (L.) Ell.**

On 2 June 1964, the author collected flowering and fruiting material (Aston No. 1202) of this species from a lagoon of the Ovens River, about $1\frac{1}{2}$ miles N.E. of Wangaratta, in north-eastern Victoria. This seems to be the first record of this species occurring naturalized within Australia.

Since this date I have carried out extensive sampling along rivers, creeks, lakes, lagoons, swamps, and farm stock-tanks throughout the north-east of the State, from the Corryong district west to Barmah Forest (north-west of Nathalia) and south to Nagambie and Eildon. During this searching, *L. palustris* has been located in ten areas, all restricted to the valleys of the Ovens and the Kiewa Rivers. No trace of it has yet been found in any other area visited, including the nearby Mitta Mitta River which was sampled along its lower reaches from Tallandoon to Tallangatta. Along the Ovens River the species occurs either frequently or abundantly from Myrtleford to the Murray Valley Highway (about 2 miles short of the confluence of the Ovens and Murray Rivers), a direct distance of some 49 miles. Along the Kiewa River it occurs similarly from Upper Gundowring north to the Murray Valley Highway, about 5 miles east of Wodonga, and again only 2 miles short of the confluence of the Kiewa with the Murray River. This is a distance of approximately 26 miles. At present, therefore, the species is known to extend along approximately 75 miles (direct line) of river valley, and probably extends still farther as the rivers upstream from Myrtleford and Upper Gundowring have not yet been searched.

In an endeavour to locate the origin of the occurrences, an approach was made to the State Electricity Commission of Victoria, as it was thought that the plant might have deliberately been introduced as a mud-binder around pondages of the Kiewa Hydro-electric Scheme. However, the Commission has informed us that they have not used this species, so that its origin in the area is still unknown.

L. palustris grows as a non-flowering aquatic in water up to 1 foot deep, but is at its best as a terrestrial on wet or saturated mud beside water. Here the plant spreads by rooting stolons to form a

prostrate mat, and becomes an excellent mud-binder. Flowers and fruits are produced abundantly, and would presumably be easily transported by water. Once established beside a river system, it would spread rapidly, and this seems to have been the case along the Ovens and Kiewa Rivers. It will be surprising if the species does not extend down the Murray River within a short number of years, and it can also be expected that it will establish itself in adjacent areas. Dr. Barbara Briggs (pers. comm.) has informed me that it is not yet recorded for New South Wales.

The ability of the species to spread rapidly is well-recorded for New Zealand. Raven (1963, p. 403) writes "The earliest record for New Zealand seems to be from about 1929 (Allan, *N.Z. J. Agr.* 47: 311-313, 1933), when it was recorded from a few stations on the North Island; it has spread explosively and now is found over the entire North Island and locally on the South Island as well (Miss Ruth Mason, pers. comm.). Probably it was introduced into New Zealand from Europe".

L. palustris is a native of North and Central America, Colombia, and of much of Eurasia east to the Caspian Sea and northern Iran and south through Spain, Italy, and Greece to northern Africa. As well as Australia and New Zealand, it is also introduced in Hawaii and southern Africa. See Raven (1963, p. 400).

A botanical description and illustration is available in Mason (1957, p. 611 and fig. 279).

Myriophyllum brasiliense Cambess.

This South American species has now become naturally established in Victoria in four areas within the vicinity of Melbourne, and has not previously been recorded for the State. All four occurrences have been located and kept under observation by Mr. Ian Tankard, a teacher at Albion State School, who brought specimens to the National Herbarium for identification and who has supplied full information concerning them. These occurrences are:

(a) Studley Park, Kew, approx. 3 miles E.N.E. of Melbourne G.P.O.—in the Yarra River just upstream from its junction with the Merri Creek. In 1961 three large clumps each approximately 30 x 10 feet in area, plus minor areas of growth, were located growing luxuriantly in water from 1 to 5 feet deep. Visits during the summer months of January and February 1963 and 1964, showed the clumps to be persisting. Winter visits during 1964 showed marked alteration in growth, the emergent foliage vanishing between March and September visits, leaving only bare submerged stems. A further November visitation showed new growth emergent, and re-covering of the original areas.

(b) Royal Park, approximately 2½ miles N. of Melbourne G.P.O.—immediately west of the Zoological Gardens. In March 1963, many small, dense patches were located along a small tributary of the Moonee Ponds Creek. In March 1964 this luxuriant growth was again present, but between then and September the

emergent foliage died back completely as in the case of the Studley Park colonies. During May 1965 similar die-back was observed again.

(c) Carrum, approximately 20 miles S.E. of Melbourne G.P.O.—in the vicinity of the Wells Road Bridge over the Patterson River. In May 1964 many clumps, the largest about 30 x 12 feet in area, were located in and along the river both up and downstream from the bridge, occurring on damp ground or in shallow waters up to 2 feet deep. Emergent growth was quite luxuriant, and the plants were in flower (female flowers only). The same situation existed in September, with plants still flowering, and November also showed luxuriant growth. Further searching in May 1965 has shown that occurrences may be more extensive than at first observed. The colonies are scattered over at least 500 yards of the river's length.

(d) Mordialloc, approximately 15½ miles S.S.E. of Melbourne G.P.O.—in Mordialloc Creek and an adjoining drain at a position half a mile upstream from the Creek mouth, and less than half a mile from Mordialloc railway station. In January 1966 four small clumps, each about 3 to 5 feet in width, were found over a space of 50 yards. Growth was quite luxuriant and some female flowers were present. The water at this point is still subject to tidal influence and was somewhat brackish, while surrounding ground supported salt-loving species such as *Salicornia australis*, *Cotula coronopifolia*, *Triglochin striata*, and *Selliera radicans*. This area is approximately 4½ miles from the Carrum occurrence.

In view of the above observations it would seem that *M. brasiliense* has been naturalized around Melbourne for some years, but overlooked, and it is likely that more occurrences will eventually be located. The species is known in the aquarium trade and cultivated in ornamental pools, and it is not surprising to find it as a naturalized escape. Spread within Australia must be by vegetative means, for male flowers are unknown in this country and hence fruits are non-existent. The winter die-back shown by the Royal and Studley Parks colonies is interesting, and could assist in preventing rapid and troublesome spreading in the colder climates of south-east Australia. It is possible however, that these die-backs were only co-incidental with the season, and that other factors such as stream pollution could be responsible. The Carrum colonies have shown over-winter luxuriance. Further observations are necessary to clarify this point.

Australian occurrences of *M. brasiliense* are confined to the Eastern States. Curtis (1956, p. 190) records it as local in fresh-water ditches at Bellerive, Tasmania, but in 1964 (pers. comm.) indicated that it may soon be eliminated from that locality by building programmes. It has been recorded in several New South Wales localities, the N.S.W. National Herbarium having specimens from Centennial Park, Sydney, 1908; Murwillumbah, 7.1910, Tweed Shire Council Clerk, "Sent as a dangerous weed threatening to become a pest like the water hyacinth"; Tweed River, 5.1911, "Said to be plentiful but it

may become a trouble to navigation"; Byron Bay, 11.1940; Gosford, 5.1941; Hannam Vale via Taree, 10.1951, "Blocking up a creek"; Armidale, 4.1964, "Growing on edge of dam," and also cultivated specimens from the Botanic Gardens, Sydney. These localities cover the eastern near-coastal areas of the State from Sydney northwards to the Queensland border, and from the comments quoted from the herbarium labels there is an indication that in warmer waters the species can become troublesome. This is supported by information forwarded by Mr. S. L. Everist, Government Botanist at the Brisbane Herbarium, regarding occurrences in Queensland. Mr. Everist advises in correspondence that it is known to occur in Currumbin Creek and Upper Tallebudgera Creek in the extreme south-eastern corner of Queensland, and in a couple of places in the Mooleolah River west of Caloundra, i.e., 40-50 miles north of Brisbane. It is quite an aggressive plant at these localities.

A botanical description and illustration is available in Mason (1957, p. 615 and fig. 280).

***Sagittaria graminea* Michx. var. *weatherbiana* (Fernald) Bogin.**

During 1964 almost simultaneous collections of a species of *Sagittaria* were made in Victoria and in New South Wales. As material within Australian herbaria is inadequate for the determination of members of such a difficult genus, identifications were made by reference to Bogin (1955), who published a complete revision of the genus. New South Wales collections were determined by Dr. Barbara Briggs of the N.S.W. National Herbarium, and the Victorian collection by myself. In each case the collection proved to be North American *S. graminea* var. *weatherbiana*, both the species and variety previously being unrecorded for Australia. Details of occurrence are:

Aston No. 1215, collected by the author on 5 June 1964, in Nine Mile Creek at Wunghnu (5 miles south of Numurkah) in north-central Victoria. Here the species was growing, flowering and fruiting abundantly, for 50 yards both up and downstream from the road bridge at Wunghnu. A search was made for any further colonies along the stream, and sampling done in nearby areas along creeks which form an interconnecting system with the Nine Mile Creek. The species was not located elsewhere and would seem to be well-established but localized at Wunghnu. However, further searching may produce fresh colonies.

N.S.W. No. 65392, collected B. Briggs, 20 July 1964, at Casula, on the banks of the Georges River and near the railway station, i.e., ca. 20 miles W.S.W. of Sydney. It occurs also at Liverpool, about 3-4 miles N.E. of Casula, and further searching may lead to its location in other areas along the river.

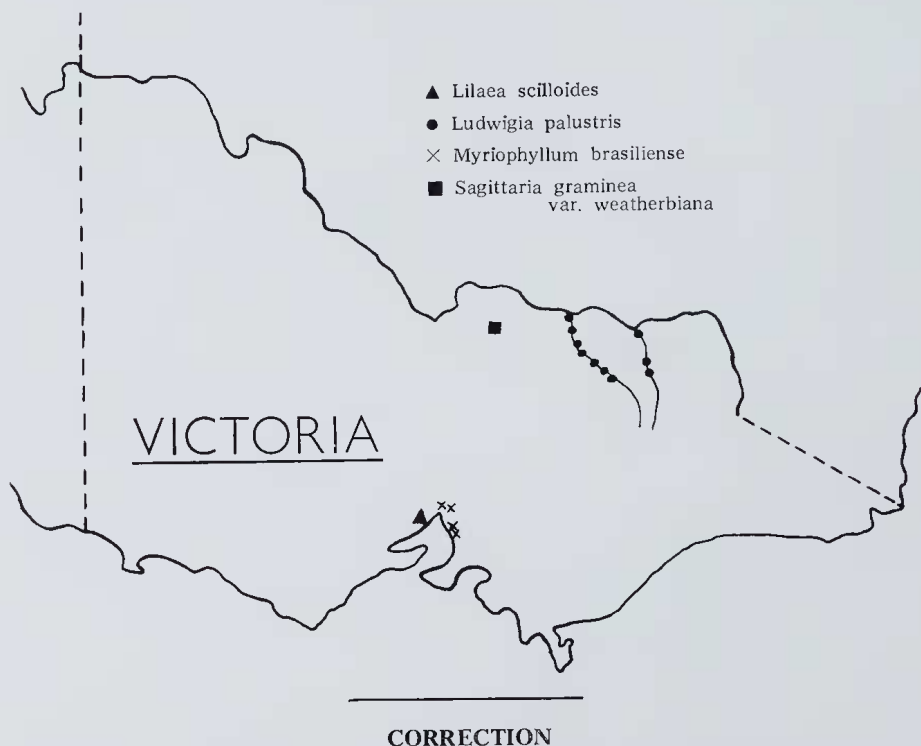
Acknowledgements

Those people who have helped in the gathering of material or of data necessary for the completion of this account are mentioned where appropriate in the text, and I would like to extend my gratitude

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References

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In *Muelleria* 1²: 111–112 (1959), paratypes of *Brachycome tetrapherocarpa* and *B. dimorphocarpa* were ascribed to the herbarium of Waite Agricultural Research Institute (Adelaide). These specimens were destroyed by fire at Armidale, N.S.W., before the author of the two species (Dr. Gwenda L. Davis) distributed them, as intended. Fortunately, other paratypes had already been lodged at the National Herbaria of both Melbourne and Sydney, and they remain intact.